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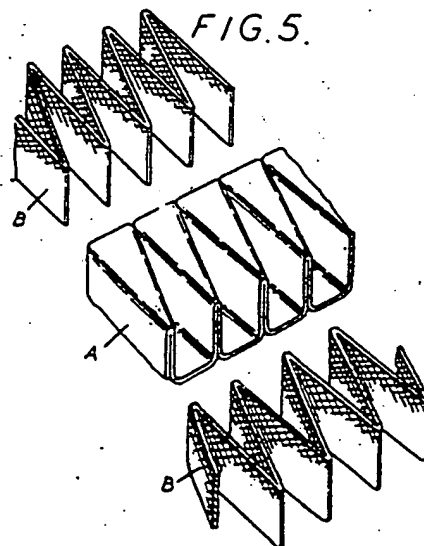
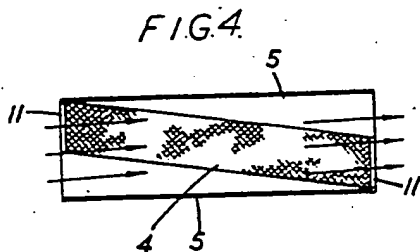
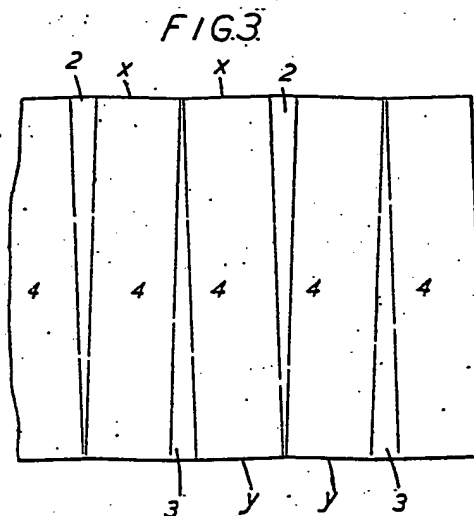
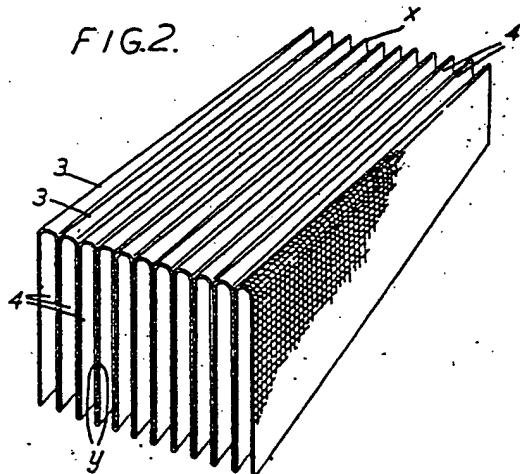
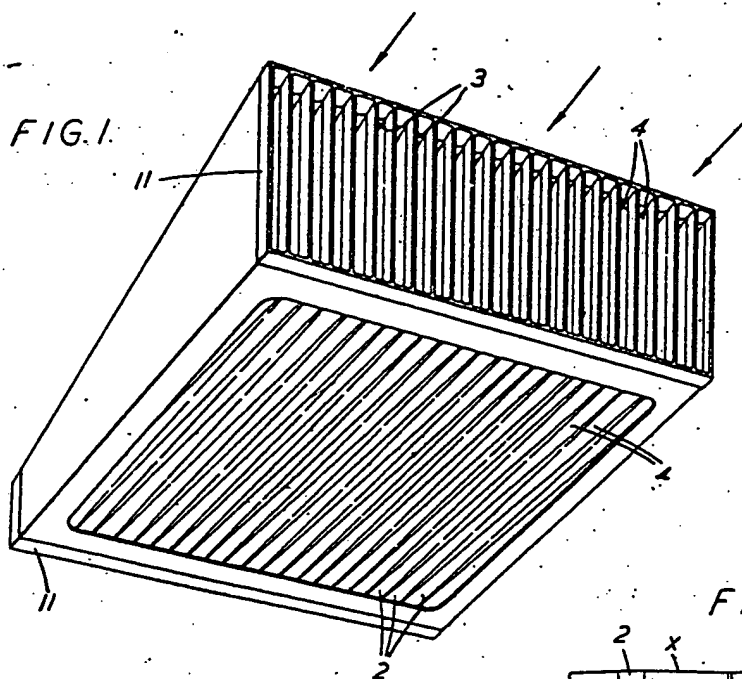
BRITISH

563768

563,768 COMPLETE SPECIFICATION

1 SHEET

*[This Drawing is a reproduction of the Original on a reduced scale.]*



493

210  
169

# PATENT SPECIFICATION



Application Date: Feb. 8, 1943. No. 2108/43.

563,768

Complete Specification Left: Feb. 18, 1944.

Complete Specification Accepted: Aug. 29, 1944.

EXAMINER  
COPY

## PROVISIONAL SPECIFICATION

DIV. 1

### Improvements relating to Filters

I, CECIL GORDON VOKES, a British subject, of 95—105, Lower Richmond Road, Putney, London, S.W.15, do hereby declare the nature of this invention to be as follows:—

6 Deeply pleated filter elements are now used in a variety of forms to give a large filtering area in a relatively small space. Commonly a somewhat stiff material or  
10 combination of materials is used, so that joints can be made with the elements, and pleats will retain their shape, with the help of spacing means when necessary. For instance, wire gauze has been used  
15 to support felt or other textile material, or fibrous material between layers of buckram or other stiff cloth; and other forms include several thicknesses of wire gauze, either pleated together or in  
20 layers of the pleated material. The present invention is designed to give a deeply pocketed or pleated effect with such and other appropriate materials,  
25 particularly in cases where the depth of the pockets is to be very great relatively to the cross-sectional area of the inlet or outlet.

In the normal elements at present  
30 formed by pleating, bends or folds face the inlet and outlet: there is a bend or fold between the mouths of adjacent pockets. In arrangements according to the present invention the bends or folds  
35 run the other way, so that in effect the pleated or bent material surrounds three sides of each pocket and the walls of adjacent pockets are joined between pockets, where entry (or exit) of the fluid  
40 is blocked, preferably by securing the edges of the material together. Other parts of the invention are embodied in a typical form forming a deeply pocketed airfilter unit with a low but wide (or

high but narrow inlet and outlet. The unit includes an element of appropriate filtering material, reinforced with wire gauze, which is folded or corrugated with the folds or bends lying in substantially what will be the direction of air flow. 50 The front and back of the element are provided with rectangular metal grids of which the bars form clips to fasten together the necessary portions of the adjacent corrugations: the front and back bars are staggered relatively to one another, so that deep pockets with open mouths and closed backs are formed. The element is encased on all four sides with the grids forming the front and back of the casing and the latter presses on the folds (with a lining of jointing material, if necessary) so that each pocket is preferably approximately rectangular in cross section and tapers back until its wall is secured to that of the adjacent pocket. In some cases the reinforced material of the unit may be originally crimped into substantially the required form of triangles alternately facing towards the front and towards the back and separated by preferably rectangular panels which will form the filtering portions through which the air or other fluid will actually pass. Another possible 75 form would include two lengths of wire gauze or the like so crimped, one being relatively reversed so that they inter with a length of filtering cloth or like between them in the filtering portions but exposed outside the triangular portions to make joint with the casing.

Dated the 8th day of February, 1943.

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Agents for the Applicant,  
201—6, Bank Chambers,

329, High Holborn, London, W.C.1.

## COMPLETE SPECIFICATION

### Improvements relating to Filters

I, CECIL GORDON VOKES, a British subject, of 95—105, Lower Richmond Road, Putney, London, S.W.15, do hereby declare the nature of this inven-

[Price 1/-]

tion and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Deeply pleated filter elements are now used in a variety of forms to give a large filtering area in a relatively small space. Commonly a somewhat stiff material or combination of materials is used, so that joints can be made with the elements and pleats will retain their shape, with the help of spacing means when necessary.

In instance, wire gauze has been used to support felt or other textile material, fibrous material between layers of buckram or other stiff cloth; and other forms include several thicknesses of wire gauze, either pleated together or in layers of the pleated material. The present invention is designed to give a deeply pocketed or pleated effect with such and other appropriate materials, particularly in cases where the depth of the pockets is to be very great relatively to the cross-sectional area of the inlet or outlet.

In the normal elements at present formed by pleating, bends or folds face the inlet and outlet: there is a bend or fold between the mouths of adjacent pockets. In arrangements according to the present invention the bends or folds of the filtering material run across the direction of the normal bends or folds so that in effect the pleated or bent or corrugated material surrounds three sides of each pocket and adjacent walls are joined between the mouths of adjacent pockets, where entry (or exit) of the fluid is blocked, preferably by securing the edges of the material together. The front and back closed ends of the pockets are thus transverse to the folds of the material and a zig-zag effect is produced between front and back in a direction transverse to the zig-zag of the folds. From another point of view a filter element is formed of material folded to include triangular or wedge shaped top sections tapering in one direction alternating with roughly triangular or wedge shaped bottom sections tapering in the opposite direction, side wall sections (of parallel or tapered form) separating the top and bottom sections. The terms "top", "bottom", "side" and so forth are to be understood in this connection as conveniently indicating relative positions only and not that the element necessarily lies in any particular plane.

Other parts of the invention are embodied in the examples illustrated by the accompanying drawings. The parts for which a monopoly is desired are those delimited by the claims.

In the drawings:—

Fig. 1 is a front perspective view of a filter unit capable of being positioned in a duct or over a desired aperture.

Fig. 2 shows a folded element of filtering material suitable for incorporation in suitable units or filters,

Fig. 3 illustrates how filtering material is bent in forming an element, and

Fig. 4 shows an element located in a duct.

Fig. 5 is a perspective view illustrating another possible form.

As shown at Fig. 1 a deeply pocketed air-filter unit has a low but wide (or high but narrow) inlet and outlet. The unit includes an element of appropriate filtering material, reinforced with wire gauze, which is folded or connected as a whole as described above with the folds or bends lying in substantially what will be the direction of air flow. The front and back of the element are provided with rectangular metal grips 11 of which the bars 1 form clips to fasten together the necessary portions of the adjacent corrugations: the front and back bars are staggered relatively to one another, so that deep pockets with open mouths and closed backs are formed. The bottom triangular sections are seen at 2, the top triangular sections at 3 and the side walls at 4. The folding will be clearer from Figs. 2 and 3, where the top sections 3 are clearly seen and pairs of the edges of the side walls 4 to be clipped together by the grids are shown at  $x, x$  for a bar of the back grid and  $y, y$  for a bar of the front grid. The walls 4, 4 can be parallel-sided or tapered and the end edges such as  $x, x$  and  $y, y$  set to any angle desired for a particular application. Fig. 4 shows a convenient use of an element or unit according to the invention inclined across a duct, the edges  $x$  and  $y$  being angled to lie perpendicular to the walls of the duct. It will be observed that in addition to one end of each pocket being open, the top or bottom (as the case may be) is also open. The element may be encased on all four sides to form a complete unit as shown in Fig. 1. According to the use to be made of it, the upper and lower sides may be apertured or closed. Thus, in Fig. 1 the upper side may be closed where delivery is to be confined in the back grid 11 and if entry is to be confined to the front grid 11 the bottom can preferably be of the form shown, but blanked off when in its duct or housing in use; or a removable cover may be fitted. Dust will then readily fall away from the dirty side when the unit is removed for cleaning. By appropriately placing or encasing the unit the top and bottom may be allowed to remain open, e.g. in Fig. 4 the front and bottom of a set of pockets may be open to entering air while the

intervening spaces (or revers pockets) may be open to the clean side, so that practically the whole area of the filtering material (i.e. all except the extreme edges at front and back) is in use. The casing presses on the folds (with a lining of jointing material if necessary) so that each pocket is preferably approximately rectangular in cross section and tapers back until its wall is secured to that at the mouth of the adjacent reverse pocket. In some cases the reinforcing material of the unit may be originally crimped into substantially the required form of triangles alternately facing towards the front and towards the back and separated by preferably rectangular panels which will form the filtering portions through which the air or other fluid will actually pass.

Fig. 5 illustrates a form in which the filtering material A is held to the form of the present invention by using on one or both sides of it reinforcing material B crimped to the normal zig-zag form. The reinforcement B is shown withdrawn from each end of the filtering material and it will be observed that the reinforcement has its bends at the end of the pockets in the normal way while the filtering material is bent round to form in effect three sides of each pocket. The side walls could be so tapered as to be themselves substantially triangular and in that case a "grid" at the apex end would reach the extreme case of having no bars (since the side walls are already joined) and would in fact become a mere flat clamp.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A filter element forming a number of pockets defined by pleated or bent or corrugated filtering material surrounding in effect three sides of each pocket, adjacent walls of pockets being joined at the ends of the folds in staggered relationship so as to produce a zig-zag with the said joins at the bends in a direction transverse to the folds.

2. A filter element formed of filtering material folded to include alternating top

and bottom sections of shape roughly triangular or tapered, the top sections tapering in one direction and the bottom sections in the opposite direction, and side wall sections separating the top and bottom sections and having their front and back edges joined in staggered relationship.

3. A filter element of material pleated or bent or corrugated into zig-zag form with the walls of "upward" bends held in contact at one end and the walls of "downward" bends held in contact at the other end so as to produce a zig-zag effect transverse to the aforesaid zig-zag.

4. An element according to any of the preceding claims having a grid whereof the bars form clips holding together edges of the filtering material and defining between them spaces for passage of fluid.

5. An element according to any of the preceding claims and having an inlet grid and an outlet grid arranged to clip together in relatively staggered relationship the edges of the filtering material at the inlet and outlet ends respectively.

6. An element according to any of the preceding claims and encased on all four sides to form a unit.

7. An element according to any of the preceding claims and a duct, the element being disposed at an inclination across the duct.

8. An element according to any of the preceding claims and a duct, the element being disposed at an inclination across the duct the top and bottom of the element being exposed to permit of the passage therethrough of fluid passing along the duct.

9. An element according to claim 2, the edges of a side wall section which adjoin the adjacent top and bottom sections being substantially parallel.

10. An element according to claim 2, the side wall sections being of tapered form.

11. The new or improved filter elements substantially as described or as shown upon the accompanying drawings.

Dated the 18th day of February, 1944.

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